Crop Response to Tillage and Rotation Under Non-Irrigated and Sub-Surface Drip Irrigation Systems.

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Research, funded by the North Carolina Peanut Growers Association, was initiated during 2001 at the Peanut Belt Research Station near Lewiston-Woodville (Norfolk sandy loam soil) to compare crop response to agronomic and pest management practices in various irrigation systems including sub-surface drip (SSD). In general, yield increases from SSD irrigation vs. no irrigation were noted for corn, cotton, and peanut in 4 of 4, 6 of 9, and 4 of 6 years, respectively. The average increase in yield for these respective crops was 47% (range of 34 to 59%), 30% (range of 1 to 54%), and 21% (range of 6 to 34%). For year/crop combinations where a yield increase was not observed from SSD irrigation (5 of 19 year/crop combinations), the ratio of water provided by the combination of SSD irrigation and rainfall to rainfall only was 1.25, 1.27, 1.28, 1.29, and 1.43. When a yield increase was observed (14 of 19 year/crop combinations), this ratio was 1.42 in one instance and 1.50 to 4.67 in the remaining 13 year/crop combinations. More specifically, in one experiment conducted from 2007-2010 and repeated from 2008-2011, crop yield in strip tillage vs. conventional tillage was compared in SSD irrigation with no irrigation in a rotation of cotton-corn-corn-peanut. The interaction of experiment (2007-2010 vs. 2008-2011) by irrigation (SSD irrigation vs. no irrigation) was significant for corn, cotton, and peanut yield. Corn, cotton, and peanut yield increased with SSD irrigation compared with no irrigation regardless of tillage system, with differences in yield for experiments reflecting differences in the magnitude of response. Cotton and peanut yield was not affected by tillage system or interactions of tillage and irrigation systems. However, corn yield was affected by this interaction. Corn yield in the first year of the corn sequence was higher in strip tillage than conventional tillage in absence of SSD irrigation; yield was higher in conventional tillage with SSD irrigation. In the second year of the cycle of corn, no difference in yield was noted when comparing tillage systems in absence of SSD irrigation. However, yield in conventional tillage exceeded that of strip tillage when SSD irrigation was included.